AVOCATIONAL COMPUTERISTS' PATHFINDER

WRITTEN AS A HOBBY BY-
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CANADA

-------The Amateur Computer User's Newsltter That Also Tracks Techno-Trends--------
Issue of Dec.20, 1993...except pages 2,3,4,7 ©1994 in the public domain..8 pages

This marks our fifth year of publication of this amateur newsletter, and to further commemorate it, this issue includes on page 7, an index of the contents of previous issues. Unfortunately, most of the previous issues are no longer available, even the originals having been thrown out in a clean up which leaves us all the more elbow room for further work, which is not a bad thing, in these cramped quarters. But the last couple of issues are available as backissues at $2 each. So,on to out techno-topics of the present.

Speaking of the future, some major changes may be in the process of building up a sort of threshold of speed and form, to achieve escape velocity, but it is impossible to see the shape of the future clearly through the smoke and fog of the radical changes in hardware and software that are chruning in the minds of so many competing vendors in the microcomputer product market. Where will it all end? On page 8, the writer taks some predictions and puts a personal twist on them. Is the microcomputer reaching burn put? What will replace it. This topic is so intriguing, that the writer hopes to do it further justice in a new newsletter on techno-trend speculation, in which the article on page 8 will be expanded. Send in $10 for a preview of future copies. (Which will be published on demand, if any all.) The other current interest of this writer is the history of technology, particularly the economic history of electronics of the vacuum tube era, and perhaps that will result in a newsletter also. To venture into the nostalgia of old tube radios, television sets and the training of technicians in the military in WW2 and the Cold War, may be fascinating, but a going a little too far back for readers of this newsletter. The history column in this newsletter that you have in your hands, deals this issue with those old line editors that computer users of the 1970's will remember using and going through a certain amount of frustration in learning how to use. If you want to know where MS DOS EDLIN.COM or CP/M ED.COM text editors came from, this article on page 3 will give you a taste of the flavour of their early forms,back in the days when text editors were really primitive programs. Then, in getting back to the future, a revision of the article published in another hobby computer newsletter in 1987, explains how light can be used to make a computer work, instead of just electrons, the revsions made necessary and the topic all the more in the news, with the passage of time bringing CD disks (that work off light) into the home. Read about it on page 4 and 5.

One of the most troublesome pieces of machinery on a computer is the disk system. For that reason, a software and ordinary user useful glossary of some disk terminology is included on page 2, this newsletter's usual space for user helpful educational articles. This is a glossary with a difference in that the terms and the defintions are carefully chosen to be of maximum use to the average MS DOS user rather than the hardware hacker or techn-nerd. So do not pass it by, thinking that it is not addressed to the average user. It is for you.

Finally, there is the question of where our computer hobby is heading. To that end, this issue contians an article on page 6 examining why our MS DOS (IBM clone) computers are looking old fashioned compared to the new models, largely Windows (Microsoft trademark graphic interface) or OS/2 (IBM Corporation's answer to the challenge of both Windows and UNIX, the latter a trademark owned by Novell). So we as hobbyists start a new year in a couple of weeks, really uncertain about what is likely to last as a home computer and hobby computer trend and what will fall by the wayside as obsolete. If you are thinking of buying a new computer to move up from MS DOS to something Windows compatible, you will likely be caught in the middle of the issue of whether you should pay as little as possible and get less capability or more than you need, and buy things just before their price comes down, anyway. With money no longer easy, and computers and their software plunging on into the nightime of obsolescence ever faster, it may be worth it in money wisely rather then hastily spent to give it some thought in advance.

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* For new correspondents, please enclose a couple of bucks to hep pay for postage, etc. of a reply, and extra enclosures if any, that need photocopying.

abort - This simply means that some difficulty has come up, like an incorrect command being entered, and so it cannnot be done, or the file named cannot be found, perhaps because no such file ever existed, and so it cannot be referred to, by way of i/o. It is a message asking you if you wnnt to give up and abandon the attempt to make that command work. If so, enter "A".

bad sectors - In order to waste as little of the disk as possible and keep track of the areas of the disk used up and free, the disk is broken up into sectors, so that to save a text file of 1,200 bytes (about 200 English words of a letter, for example) would require at least three sectors of 512 bytes to be used if a 360K floppy disk is used, —5¼ inch, DSDD, MS DOS. If a sector cannot be used, as found out by the computer when it tries to write something in the sector but cannot read it back (or not completely) due to a scratch or dirt on the disk at that spot, that sector is marked as a bad sector when the disk is formatted, and will not be used for that reason (cause of errors).

cluster - Normally, to save time, the computer will not write just to one disk sector at a time, but two at a time, one after the other (on a DSDD floppy disk at least). Writing on groups of two sectors successively, is writing to a cluster, when done for this reason. Cluster errors are more often the result of a problem with programs than a damaged disk. See a good reference book for further info.

cylinder - In the days of hard disks in big computer, multi-disk stacks were used, and so this old name for a track postion, stuck with old hands down to the present. The vertical row of read-write heads on a hard disk, does sort of trace part of the outlien of a cylinder, on the disks, so it seemed like a good, if somewhat mathematician's oriented way of describing track position to which the head was moved.

format - Before a disk is used, it is run through the computer, (or equipemn the computer at the manufacturer's if sold pre-formatted) to mark, among other things, what kind of c computer, (IBM or clone for example) it is intnded to be used on. If you put a disk for an Apple Mac or a Commodore 64 in an IBM PC, the computer will look for those special marks unique to disks intended to be used on the computer of its type, and if the disk does not look familiar reject it with an error message, like "Disk not formatted or disk error" which may mean that the disk is formatted, but just not for our type of computer.

hidden file - On some disks, most often just the MS DOS/PC DOS system disk, some files are specially coded so that they do not show up on the screen when you pull a directory of contents of the file, with DIR. They are files that are used by the automatic operator assisting programs generally known as the operating system and not used by the user. So in order to Keep the user from fooling around with them, they are hidden from view.

ignore - This message like abort, is given when something goes wrong, and is telling the operator that you can try again just in case nothing is seriously wrong. If you key in I, for ingore and the same message as before comes up again, then give up, because it is a serious error. would be the simplest advice to the first-time student taking a course.

navigate - Unlike browse, which means looking through the contents of a disk or other memory, character by character, navigating a disk means exporing the directories and subdirectories, to find all the files you are interested in. There are utilties to allow you to do this.

redo from start - Some programs using Microsoft BASIC will, when the user is inputing data, and presses the comma key, throw away what was just entered and give you a fresh start.

retry - When something goes wrong, the MS DOS error handler will sometimes print on the video screen, the message,"Abort, Retry, Ignore?" and expect the user to enter an A, or an I, or an R for retry. The trick is, that you must not change floppy disks usually, since the computer memorized the contents (dir anyway) of the disk in the drive now and will be perplexed if you switch disks on it. Just press A for abort to abandon the attempt if you need to change disks, and start over again from the first.

sector - See "cluster" for explanation.

track - This can mean the po tion of the head, from 0 on the outside of the disk to 40 around the disk's center, of a 5¼ inch DSDD disk, -or- it may mean the track, 0-80, where the odd numbers are the 40 on the bottom of the disk, 1-3-5...-79 and the even, are the write po tions on the top of the disk, 0-2-4...-80, so what it means depends on the way it is used in the context. The one meaning of track is track position, the po tion of the head over a track, also known as cylinder (see cylinder). The other meaning is a little more common in the IBM clone/MS DOS context, and refers to which track (block of sectors), something like a part of a text file, etc., may be found on.

Famous Mainframe Computer Software: Line Editors

One of the pieces of computer software that most users of old mainframe computers will have encountered, is the line editor, a primitive text editor program, a predecessor of both full-featured word processors and the full-screen editors that computer hobbyists are used to in home computers, (and usually used to edit BASIC programs, or the BASIC command line). The old line editor was justly famous, not for a good reason but a bad; it was simply a frustrating piece of software to use. Fortunately, it was quickly bypassed by the evolution of better text editors by the time the home computer started to become a mass-market item, so few home computer users have had much of a run in with it.

So, it is necessary to take you to a session in the 1970's or earlier, with you, the young student, sitting down to a video terminal (or old teleprinter terminal), faced with a deadline, and confusing instructions on how to use it and you type a line, "This is a test.", and hit the enter key. Then another line, "This is easzx", and hit the enter key for that line. Then you say, "Oops, made a mistake," and try to correct it. You look at the commands and realize that you must get into command mode. You find a control key like "Escape" will do that. Unfortunately, you are into a new screen now, and the rest has scrolled far enough, that you want to display what is there. Try the command "L" for list, and the computer takes it, and lists nothing. Problem is, the list will list a page of lines, after where you left off. There is an internal variable in the program that points to which line you left off at. How to reset it to the first line of the program? Try the 'up' command. Still nothing. Of course it moved the last line, but does not list it, so you enter the L for list command again, and again nothing. The UP the pointer to the current line up one, but the list moved it down one again, so when you went to list again, you got nothing. Eventually you find that a command like B for bottom (or begin) moves the cursor-line pointer all the way to the top, or was B for bottom, I forgot. Anyway, after a good three hour session while others wait to get their hands on your terminal, with varying degrees of patience, you have managed to save mostly unknown garbage to your file in the main computer storage area. And of course, it is not by the end of the session, but a long, long time later, that you realize what could have gone wrong and come to the point where you can explain what must have gone wrong.

The writer had his initiation as an evening student on a terminal at college to what was practically a super computer, running XENIX. Others will remember first frustrations on other hardware. But those who critisize the CP/M editor, ED, or the MS DOS editor EDLIN, will not likely appreciate how those editors were big improvements. Such line editors have three parts, or modules — a one-line-at-a-time line enter function, a command interpreter to take your commands like "d", to delete the line the line-pointer is pointing to, and a set of subroutines to do the actual low-level editing, data (text) moving and slicing, etc. To put it mildly, working with such an editor required a lot of skill, and memorizing both commands and what they did (and did not do) as well as keeping a mental eye image of where the current line is (the line the line pointer refers to) and where the disjointed display of lines shown on the screen fit into the whole text. Getting such features as word search and search and replace must have made such line editors seem like a great improvement at the time to data processing professionals. It is just that now, we have so much more and available so much more easily with screen editors and word processors.

In the middle of the early home computer era, home computers switched from editors based on the earlier line editor type to screen editors for their use of the BASIC operating system command line and BASIC programs, the dividing line in for example Commodore computers coming between the line-edit type VIC-20 and the screen edit type, Commodore 64, the latter also followed in IBM PC/MS DOS BASIC versions at the beginning (BASICA and GWBASIC). The early BASIC editors used the line-at-a-time approach at least partly, because ASCII lines stand alone, a feature of BASIC language itself that resulted in part from its use in terminals with multi-user computers and in part in a tradition of breaking a program into lines that goes back to unit record type input/output of punched cards with FORTRAN. But they differed from the old mainframe editors for text in that they automatically placed updated lines on the screen (normally) and also lacked the complicated edit commands. (Unfortunately a variable search and replace might have been good in BASIC and variable table listing, etc. but BASIC fell out of favour as a programming language around the time such programmer-friendly features started showing up in BASIC dialects.)

So that is the ancient history of line editors. Let's be happy they're history!

Light Computers

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Light can be used to carry the bits and bytes of computers, and simple light-based components and processors are appearing in military signal processors, where they need to run with the speed of a rocket powered missile. They are also showing up in the telephone system along with fiber optics, since only very fast "robot operators" can handle the number of calls going through the light pipes today. So the light computer is almost here. **But we can agree they can exist, and still not be** sure what they are and how they differ from electronic computers. One might explain firstly that it is not the task that makes them different; they would be designed to do the same sort of computing and data processing jobs that electronic computers do currently, but it is how they do it. Light computers carry their bits and bytes in patterns of light, not electron flows or pressure of electric fields on electrons (voltages).

In an electronic computer it is the switching on and off of the flow of electrons that is used to represent the bits and bytes of data and logical relations in computer operations. The fundamental circuit of electronic computers is the transistor switch. It may be a single transistor in a case as with the older computers of the 1950's and 1960's or it may be that the transistor is one of many built into a silicon chip i.c., an integrated circuit. From many switches, Boolean logic operations, routing of data, storage of data in flip-flops or memory cells of MOSFET transistors and arithmetic operations can be performed.

A light computer would similarly use switches as its basic building block but the switches would switch light rather than electrons. The light would flow along fibre optic cables of glass rather than metal wires and through light pipes engraved in integrated circuit chips and boards. The actual switching might switch a light beam on or off or switch its frequencies or its polarization to give three possible examples. But the principle of switching light would be the same as with switching electrons in a transistor, one signal controlling the switching of another, typically a small input signal switching a larger output signal.

Are we likely to see a light (or photonic as some say) computer in the near future? The writer wouldn't think that a purely light based computer will be seen for more than a decade or even decades into the future. Why? So far the building of light switching components and photonic (light) integrated circuits has only been done in the laboratory and at too low a level of complexity (only a few gates per integrated circuit) to compete with the current electronic technology by which thousands of gates can be put on a single silicon chip integrated circuit.

What would be the advantage of a light based computer? The chief one is speed. Light simply can be switched faster than electrons and there is nothing like the stray capacitance of electrical circuits to slow it down. In addition possible parallelism (switching of more than one light signal at a time) and immunity to RFI/EMI interference are also mentioned.

What we are likely to see a lot sooner is some form of hybrid light/electronic computer as more fibre optic cables could be made use of in electronic computers. If fibre optic cables were used to wire up the different printed circuit boards of a super-computer, the faster travel of light down the optic cables would speed up the computer by allowing the data to travel more quickly between boards. In supercomputers the time taken to travel down a wire is a considerable limiting factor in data processing speed and for this reason many of the supercomputers are designed with their components arrayed in a circle as close to the physical centre of the computer as possible to cut down on the time wasted in bits and bytes travelling down long wires. But there is a limit to how much this distance can thus be reduced and still make the computer complicated enough to do its job which requires as many boards as possible.

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Light to carry data has already been used in home computers in order to avoid shock, the opto-isolator in the TRS-80 Model I, for example. In future home computers, light pipes instead of wires would limit RFI (radio frequency interference) problems, preventing our computers from interfering with the use of others home entertainment electronics (like radios) and eliminating the interference our computers sometimes pick up from outside sources. The military would want them because they cannot be tapped into at a distance, like today's computers.

In addition certain wiring problems for VLSI (very complex, dense) integrated circuits might be able to be handled by using tiny fibre optic cables rather than wires to bring signals to and from the surface of the chip. This would not be possible with wires, which can not be made fine enough and must be bonded to rather large (relative to the rest of the components' sizes) pads on the chip.

What use will light-based digital components play in the future of microcomputers? At the present there are two types of light-based disks, that is disks the data form which is read by light from a laser being sensed after bounding off each spot on a track on the disk. The CD ROM uses light (reflecting and so laser beam bouncing) spots to enable the laser plus sensor to read it. The type of disk that can be written to by a computer and then read also, uses to store the bits of data, spots of magnetization, which cause the light to be polarized after it bounces off the disk, something that can be sensed by the light sensing assembly. While it is the first type, the CD ROM, that gets the press and is in all the computer stores this year (1994). The CD ROM is called a ROM, short for Read Only Memory, because the computer user cannot write on it, only read from it, the burning of dark spots onto the original disk copied by the manufqcturing machines, requiring expensive equipment. But the question remains, if the data comes (literally bounces) off the disks of both types, in the form of light, such optical disks could also supply a light signal through a fiber coptic cable to a light computer, rather than being converted to electron flow in the disk drive unit. In other words, the optical disk technology would seem to be a natural to interface directly to light computers, if they ever replace the existing technology of electronic computers, which are based on current flow (of electrons) and electric force on electrons (voltage), being of two distinct levels, one used to represent binary 0 and the other, binary number 1.

Fibre optics are used to hook up microcomputers now in some office LAN and larger, wide area networks, as well as by the telephone company for long distant trunk lines. Making the link direct, from a light computer, to a light carrying pipe like fiber optic cable, makes a lot of sense, because the software to handle multiplexing, the use of one cable, equivalent to one pair of electrical wires needed for conventional serial communication, (remember your COM ports), to carry very many signals at the same time, could then be handled by one processor, a light-based microprocessor. Designers could eliminate the middle which can become a bottleneck, the conversion from light to electronic signals and back again. Of course the speed limit on optical disks is due to the mechanism, while optical cables need have no such mechanical parts that move only with the slowness of getting moving parts to overcome their inertia, for example the rotation of the disk which can only be driven so fast, and the scanning of tracks. With communication lines like the optical ones, not limited by capacitance (the electrical energy storage similar to mechanical inertia, and unavoidably everywhere in electronics, even in the simplest wire), have a much higher speed limit, at which point the electronic-to-optical interface can become a bottleneck as well as the desing of the microprocessor itself, designed to process a hybrid of 1800 teleprinter code (ASCII is an aoutgrowth of Baudot) and 1939's electronic calcualtor technology based numeric coding. A real update could make everything run much faster and enable real artificial intelligence to be built into a pocket calculator-size device.at last fulfilling the hopes of science fiction.

That Old-Fashioned Look and Feel of MS DOS Computers Raises Some Questions

Last night I was over at my friend Chris's apartment and talk turned to computers. After I admitted to still using my old Radio Shack IBM clone of so many years ago, the talk turned to the new computers including the one Chris was proud to demonstrate, and which seemed to have such sharp graphics and such fast clock speed specs, if not in screen handling. I went away thinking of how I could have yearned on that night at the Radio Shack computer user group when the speaker of the evening talked in such glowing terms of the computer I now have, a Tandy 1000, and how that was the way to go in the hobby, 'if you could afford so much,' as the computer was selling for about $1,999.00 then. Of course, it was a number of years later when I found one on sale at the local store and after doing some figuring, realized that since the floppy disk drive and interface were included, it was almost the same as a Commodore 64 with its expensive disk drive with its own microprocessor controlled interface, a sort of computer in itself. It seemed ok now its price at clear-out time was much reduced to what it had been on introduction as a new model to carry the new Tandy brand name. Well, I got it, and it sat on the corner of the computer table for about a year, as the first attempts to learn MS DOS and GW BASIC computer programming, went painfully slowly and the old home computer, now orphaned, continued to offer satisfaction in trying out programming ideas. But if what once seemed unbelievably advanced for a hobby computer now seems old-fashioned and its once bright aura of attraction yellowed and tarnished, it does raise the question of what makes up its old look and feel, just what the new computers have to offer that is different, and how fast they will tarnish too.

The new IBM clones offer animated flying toasters, and they have the power to perform animation and sound while also doing something useful, as compared to that fascinating stick figure, the dancing devil and its music, playing on the old Radio Shack TRS-80, and using up its processing power to the maximum, just to do its endless dance. So something has changed for the user, and a bystander watching that dancing devil of the late 1970's would have said, 'But what do you really use your computer for?' implying the dancing devil was but a gimmick, and not enough justification. Well, today's computers have the gimmicks, and fancier and fancier ones, and can also run the bread-and-butter applications too. For that reason, we can predict multi-tasking and faster graphics processing to be one benefit of the new computers, over the older MS DOS types, and something that has a range to grow more into expanded hardware capacity, and create a need for computers with faster main microprocessors to handle multi-tasking and much more adapted processors for multi-media including graphics and video processing, as well as voice recognition.

As for voice recognition, a whole article was devoted to that and how voice word processors will put a dicta-typist in ever home computer of the new type and shortly after, likely a secretarial assistant, when artificial intelligence is added. The programs to do this are so big and need such fast access, it is likely that they will need to go on a shop-erasable/programmable ROM since RAM is just too expensive. It will also require a programming effort a quantuum leap ahead of current, text-based programming. (See previous issue for, 'Next Revolution in Office Automation,' that is voice interfaces and word processing.)

Early MS DOS came before CP/M which preceded those operating systems of DEC such as OS/8 for the PDP-8 and OS/10 for the PDP10, (both minicomputers of the 1970 era). What MS DOS would seem to have inherited from them was that all are single-tasking systems rather than the more suitable, this writer would venture, dual-tasking that DEC also used on some computers, for example the PDP-11. Early computers of the microprocessor types like the 8080 (CP/M) and 6502 were not quite fast enough for multi-tasking, although the Radio Shack Color Computer using the Motorola 6809, and the OS/9 multi-tasking system seemed to just handle it nicely. So the MS DOS computers are old-fashioned because they lack multi-tasking, and as a result, are not much advanced from the one-gimmick at a time dancing devil novelty stage, in that novelties like that are not really readily integrated into the main job.

The first computers were a bastard hybrid of automatic, sequential calculators for scientific calculation (today we would call them programmable calculators) and telegraph company teleprinters, the ASCII character code of the IBM PC/MS DOS and CP/M computers, only an improved and bigger version of codes like Baudot adopted in Queen Victoria's time (1800's). The fact that the IBM PC/MS DOS and CP/M computers did not integrate a better, bit-mapped, pixel mapped, graphics system into them is however the chief way that makes those computers seem old fashioned today, but keep your perspective. All is relative as we have just seen.

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(Continued from p. 6)--MS DOS Old-Fashioned

into their operation, adding one incompatible-with-text mode in pure MS DOS and in Windows (Microsoft's Trademark software) adding a whole operating system on top of an operating system to get integrated pixel-mapped graphics, is what really makes computers using MS DOS alone (without Windows) look and feel old-fashioned. Of course it is all relatibe, and the way in which today's newest 'clone' and there systems software will look obsolete in turn is by their slow multi-media and multi-tasking, compared to the next generation of systems. Or at least that is my prediction. It really seems that obsolescence is proving a feature of the business, that manufacturers can use, in part by adding non-essentials, and which creates owner-envy in home users that cannot afford continual upgrading. But at least it is a good thing to know what the fuss is all about.

(Literary Licence-In the above, the story begins with an imaginary event, writers like magicians often setting the mood with an illusion, in this case even the name 'Chris' was chosen since it is gender-neutral in implication.)

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Computers and Prices — Some Predictions

In the most excellent book, "Dvorak Predicts," by computer guru John C. Dvorak, publ. McGraw-Hill, 1994, Dvorak predicts the death of the desktop computer in favour of the laptop. He says that a laptop can be equipped with a video screen of serious size, a better keybaord, and so on, when you bring it home for the evening, and so, there is no need to have two computers. Similarly, at the office the laptop can be plugged into such big, desktop computer interfaces, and unplugged, to run on its built-in LCD screen and independently of a network, in the same way. Is there anything that cannot be miniaturized to suit a laptop, (other than screen, keyboard or printer) we might ask? Likely not. It is simply a product of the drive for efficiency evolving smaller and smaller electronics. For the hobbyist, the practical advice might be to buy a laptop if you have the money and need for a new computer, state-of-the art, or a big old desktop, if you buy used, since so many people will probably be getting rid of them in the next few years, if Dvorak's prediction is correct.

There it is on the front pages of the newspaper, that the middle-class is shrinking, and jobs created, if at all, are poor substitutes for a unionized manufacturing or refining industry job, with its pay packet and steadiness that built so many suburbs with small houses, but nice cars and no real poverty, in the 1960's. Then you flip to the computer shop advertisements inside and find that computers are more costly than ever. Something will eventually have to give. What will be the solution, the sort of computer that those with jobs that do not offer the option of spending $3,000-$5,000 on a home computer will buy. My answer is that it may not be a computer at all. It may be more like a word processor or a cartridge based game machine, but not selling for $2,000 plus. In fact, when you see wordprocessors that will input and output to a 3½ inch MS DOS formatted disk, the disk drive hidden inside the word processor, and you see it selling for $300 to $700, then you perhaps have seen the future for all but a few computer nerds on the poor side of the middle class separating line, who insist on doing their own software hacking. And of course, such wordprocessors are now selling and have been for a year or two, at business or consumer discounters, at exactly those prices. Some have bilingual spelling checkers built in, and some, displays brighter than the average laptop computer,(obtained with plasma).

So if the bright and medium bright will buy them for the price, the rest will buy them instead of a first home computer because of the word processors' more friendly interfaces, using graphics like those of Microsoft Windows or the Apple Macintoshes, and perhaps speech interfaces and modem connections, next. They will be the platform for a closed system of software that will be particularly hacker-nerdy fandangling-free. No fuss. No bother. Just turn it on and type. So the less bright and the average techno-phobic type, young or old, will buy them for their ease of operation. Since the software will be built-in and on cartridges likely, in the next phase, both hardware and software manufacturers will like them because they will be software piracy-proof.and users will like the simplicity.

The big motivation is commercial, for software piracy will continue to be a problem for big business, software and hardware makers alike, as long as critical software can be easily copied off a disk, and without anyone 'knowing.' (The copying of ROM is a commercial activity that can be more easily caught and prosecuted.) So the smart but poor, the average person and the manufacturers would like it, and so, it will take little else for mass production to bring the costs down and the benefit levels up, via added features and options. Of course, real computers will still have a sort of snob appeal for a long while after.

What counterpredictions could one offer? While laptop sales are up, it seems that the desktop is still the most bought, since it still is less expensive than the laptop, and this is a price-sensitive world. That may delay the death of the desktop computer. Another factor is that computer technology is changing towards multi-media, and maybe soon, computers with word processors that you will be able to dictate to. This software will take a long time to get the bugs ironed out and settle down to a standardized form, and the microcomputer rather than the ROM-based word-processor, is the best way to keep things flexible. A mistake or a new trend in added features is but an interface or special processor board away, at the most expensive end of modification, and a set of disks, in the least expensive case of modification. This would prolong the survival of computers, and of desktop types in particular, since they have the easiest hardware expandability. For that reason the near future remains as unpredictable as ever.